On the Host Plants of Some Hawaiian Thrips[1]

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Data on the host plants of Hawaiian thrips, most of which were collected on the island of Oahu excepting where otherwise specified, in 1938, are presented here as one of the writer's yearly series. Some material and data were supplied by other workers. A minor systematic survey of *Thrips nigropilosus* was undertaken.

THRIPS NIGROPILOSUS

Local population status and host range of *T. nigropilosus* have been studied in conjunction with an investigation of this species with respect to its transmitting ability of the yellow spot virus (8), which is a probable synonym of the spotted wilt virus (7).

T. nigropilosus was first described in 1895 from Bohemia (10), and its presence has since been reported from Norway, Sweden, Finland, Russia, Poland, Germany, Hungary, Rumania, Albania, England, and France. A species from Iowa described in 1896 under the name of *Thrips lactucae* Beach (1) was shown to be a synonym of the above and its probable introduction from Europe was presumed (2). It is known to be distributed in California, Washington, South Dakota, Iowa, Illinois, Michigan, and New York. This species was also reported from South Australia.[2]

T. nigropilosus, feeding on leaves, stems and also flowers, is polyphagus and voracious in its food habits. The reproductive potentials observed under confinement appeared as high as those of *Thrips tabaci.* Chrysanthemum is most commonly and heavily injured in Europe and North America, and chrysanthemum thrips, as the common name, was recently proposed. Cucumber, spearmint, and lettuce are also heavily injured, and many others are infested outdoors as well as in greenhouses. A complete list of hosts compiled from the references are meadow foxtail, wheat, "turf", horseradish, clover, alfalfa, bean, castor oil plant, pansy, lemon verbena, sage, spearmint, mullein, euphrasy, gloxinia, plantago, cucumber, marrow, "cucurbits", milfoil, chrysanthemum, aster, cineraria, false dandelion, centaury, dandelion, wild lettuce, lettuce, and hawkweed. The predominating family is Compositae and many plants of this family are its preferred hosts.

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[2] Samuel *et al.* (9) stated that *T. nigropilosus* was collected in South Australia and was identified by the Imperial Institute of Entomology. Morison (4), to whom all of Samuel's specimens were presumably forwarded by the institute, did not list this species among those examined. Neither did the subsequently published monograph of Australian thrips by Kelly *et al.* (3) include this species. So the presence of *T. nigropilosus* in Australia is yet to be confirmed.

T. nigropilosus was first discovered in Hawaii during 1935, when it was severely injuring lettuce in a garden at Kapahulu, Oahu (5). It was again collected from weed hosts found among wild growth at high altitudes of Mt. Haleakala, Maui, and Waimea Canyon, Kauai, which indicated an earlier introduction and wider distribution (6). The present survey showed the above presumptions to be correct.

In view of the fact that lettuce is known to be a preferred host, lettuce patches scattered throughout the island of Oahu were surveyed in July at Kahala, Kapahulu, Pauoa, Moanalua, Pearl City, Honouliuli, Waianae, Wahiawa, Paukawelo, Kahuku, Heeia, and Kailua. The presence of this species was revealed in all districts except Waianae. In some patches large populations were found causing heavy injury, and in others no visible injury was found. Other associated thrips were *Leucothrips piercei, Thrips tabaci,* and *Haplothrips gowdeyi;* the former two were sometimes found to be the predominant species. Other field infestations of *T. nigropilosus* were found on chrysanthemum at Kalihi and Manoa, eggplant at Manoa, and carrot at Wahiawa. Chrysanthemum may be commonly infested over the island, as this is the most preferred host. Although these observations were limited to the island of Oahu, similarities may be sustained also on the island of Maui and Kauai, where this species was once collected. *Hypochaeris radicata* L. and *Plantago lanceolata* L. only are the known weed hosts. In testing this species for the transmitting ability of the yellow spot virus, many plants were used as hosts under confinement. *Emilia sonchifolia* DC. was found to be a highly favorable host plant. Other plants on which large colonies were established were spinach, celery, potato, eggplant, and *Datura stramonium* L. Adults survive only for a few days and could not establish colonies on young seedling pineapple plants, tomato, tobacco (variety Turkish), and garden petunia. No case of field collection from any of these plants has been achieved.

The material collected from chrysanthemum at Kalihi included brachypterous males, the first male specimens ever collected in Hawaii.

In short, this introduced species is now well established and widely distributed. It is common on lettuce but is a subincidental species on the whole, and its known host range of field infestations is rather restricted although the potential hosts are available in an extensive series.

OTHER THRIPS

The heretofore unrecorded host plants are listed in Table 1. A common species, *Selenothrips rubrocinctus,* was found infesting surinam cherry fruits. Another common species, *Hercinothrips femoralis,* was first found outdoors infesting *Emilia sonchifolia,* and heavily infesting celery and honohono in a greenhouse. *Chirothrips fulvus* Moulton was first collected elsewhere from the type

TABLE 1. NEW HOST RECORDS OF HAWAIIAN THRIPS

Selenothrips rubrocinctus (Giard)	Surinam cherry
Hercinothrips femoralis (Reuter)	*Commelina nudiflora* L.
	Celery
Chirothrips mexicanus Cwfd.	*Panicum purpurascens* Raddi
Scirtothrips antennatus Moulton	Parsley
Anaphothrips orchidii (Moulton)	Orchid
	Parsley
Leucothrips piercei (Morgan)	Chard
	Beet
	Radish
	Mustard
	Bean
	Hibiscus
	Parsley
	Eggplant
	Lettuce
Thrips hawaiiensis (Morgan)	Papaya
	Carrot
	Thunbergia
	Chrysanthemum
Thrips nigropilosus Uzel	Carrot
	Eggplant
	Chrysanthemum
Thrips tabaci Lind.	*Amaranthus gracilis* Desf.
	Kohlrabi
	Brassica chinensis L.
	Papaya
	Parsley
	Eggplant
Microcephalothrips abdominalis (Cwfd.)	Aster
Haplothrips gowdeyi Frank.	Pineapple
	Amaranthus gracilis Desf.
	Tomato
	Eggplant
	Lettuce
	Aster

locality, although some had been captured with wind traps in other districts. It was infesting the same host of the type at an altitude of 1,000 feet along the Waikane-Wahiawa trail. Another host of *Chirothrips mexicanus* was added. *Scirtothrips antennatus* and *Anaphothrips orchidii,* both incidental species, were collected from parsley and the latter was also found commonly on orchid. On examining a large number of vegetable gardens throughout the island, *Leucothrips piercei* was found to be one of the most common and abundant thrips on various vegetables. This species was not common on weed hosts. An infestation of *Taeniothrips simplex* Morison on gladiolus was reported from Olaa, Hawaii, and another heavy infestation on extensive plantings was observed at Wahiawa, Oahu. A common flower feeder, *Thrips hawaiiensis,* was collected from four additional plants. Six others were added to the host list of *Thrips tabaci.* On papaya a small number of adults and larvae

were incidentally collected from leaves and flowers. This species was frequently observed in flower cavities of young pineapple fruits. In the course of the experiments on the transmission of the yellow spot virus (7), data on the suitability of various heretofore unrecorded plants for feeding of *T. tabaci* were collected. The plants on which large colonies were established under confinement were *Commelina nudiflora* L., *C. vengharensis* L., chard, spinach, cauliflower, broad bean, celery, potato, eggplant, bell pepper, *Datura stramonium* L., chicory, endive, and summer chrysanthemum. Colonies were less vigorous on beet, not established on New Zealand spinach, *Nicotiana glutinosa* L., and garden petunia. A predominating species, *Haplothrips gowdeyi,* was collected from six new hosts. This species was incidentally collected from young pineapple fruits, presumably feeding on flowers. This is the first record of collection from this host.

The feeding experiments on *Emilia sonchifolia* under confinement indicated that *Leucothrips piercei, Taeniothrips alliorum* Pr., and *Plesiothrips panicus* (Moulton)[3] did not survive on the plants, but *Thrips hawaiiensis, Microcephalothrips abdominalis,* and *Haplothrips gowdeyi* survived only when blossoms were available.

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[3] Dr. J. D. Hood advised that this species has been referred from *Thrips.*